EPA's Petroleum Vapor Intrusion Efforts

Why is EPA developing petroleum vapor intrusion guidance?

Petroleum hydrocarbon vapors from leaking underground storage tanks can migrate into inhabited buildings and threaten public health and safety. To address this threat, the U.S. Environmental Protection Agency's (EPA's) Office of Underground Storage Tanks (OUST) is developing petroleum vapor intrusion (PVI) guidance to assist regulators, consultants, and other practitioners in their investigation and assessment of petroleum-contaminated sites where PVI may occur. The guidance will focus on federally-regulated (Subtitle I) underground storage tank (UST) sites, which are typically gas stations. The guidance will contain information and practices that will also be useful at other sites (for example, fuel terminals and airport hydrant systems) where petroleum contamination and PVI are potential concerns. EPA's Office of Solid Waste and Emergency Response (OSWER) is developing vapor intrusion guidance that applies to hazardous substances other than petroleum (for example, chlorinated hydrocarbons) that have been released into the environment from any source, including USTs.

What is vapor intrusion?

Vapor intrusion (VI) occurs when toxic chemicals volatilize from source materials, contaminated soils, or groundwater plumes, and migrate into inhabited buildings. Vapor intrusion is a potential concern because of both immediate threats to safety (for example, explosive concentrations of petroleum vapors or methane) and possible adverse health effects from inhalation exposure to toxic chemicals. The toxic impacts of VI are usually associated with two classes of chemicals that cause soil and groundwater contamination across the country: petroleum hydrocarbons (PHCs), such as gasoline, diesel, and jet fuel; and chlorinated hydrocarbons (CHCs), such as dry cleaning and degreasing solvents. Vapor intrusion associated with PHCs is referred to as PVI, and vapor intrusion associated with CHCs is referred to as chlorinated vapor intrusion (CVI).

How do petroleum hydrocarbons and chlorinated hydrocarbons differ with respect to the vapor intrusion pathway?

The most significant difference between these two potential sources of contamination is that petroleum hydrocarbons are typically consumed by microorganisms (biodegraded) in groundwater as well as in unsaturated soil zones. When sufficient oxygen is present, this biodegradation can limit the potential for PVI. In contrast, chlorinated solvent compounds, if they biodegrade, tend to degrade more slowly and in anaerobic environments. As a result, there are generally more sites in which CVI has been an issue relative to sites with PVI. OUST is developing a paper to more expansively describe how petroleum and chlorinated hydrocarbons behave differently in the subsurface and how these differences can influence whether there is a potential for vapor intrusion to occur.

How does the PVI guidance relate to EPA's existing draft vapor intrusion guidance?

In November 2002, OSWER issued *Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils* (Draft VI Guidance). This guidance was developed primarily to address vapor intrusion from solvents and other CHCs, and it specifically states that the Draft VI Guidance is "not recommended for use at Subtitle I Underground Storage Tank (UST) sites at this time." OSWER is currently revising the Draft VI Guidance and plans to have it completed by the end of 2012.

Concurrently, OUST is developing additional guidance specifically to address PVI at Subtitle I UST sites. The PVI guidance will discuss important differences between petroleum and chlorinated hydrocarbon contaminants that require a different approach to investigating and assessing sites where PVI may occur. The PVI guidance will complement the overall OSWER vapor intrusion guidance and will not replace or duplicate that guidance effort. Mitigation approaches, where needed, will be addressed in the overall OSWER vapor intrusion guidance.

What does EPA's PVI guidance aim to provide?

The PVI guidance will provide a framework for investigating Subtitle I UST sites to determine whether PVI is not a concern, is a potential concern, or an actual concern where the exposure pathway is complete. The PVI guidance will address the following issues and also provide links to additional sources of information:

- What PVI is and how it is different from CVI;
- What criteria are used to assess the potential for PVI;
- How to develop a conceptual site model (CSM) that includes the potential for PVI;
- How to conduct a field investigation to assess the potential for PVI;
- How to appropriately use a model to support a data-based PVI assessment ; and
- How and when to engage the potentially impacted community.

What additional components and products is EPA developing as part of the PVI guidance?

EPA is developing an information paper that more expansively describes how PHCs and CHCs behave differently in the subsurface and how these differences can influence whether and how vapor intrusion occurs.

EPA is also in the process of assembling a database of petroleum release sites where the PVI pathway has been evaluated. EPA plans to use the dataset to provide evidence for biodegradation and for model testing.

Additionally, EPA's modeling studies are assessing the uncertainty associated with PVI model usage to demonstrate the capabilities and limitations of currently available models. The results of these studies will form the basis for appropriate incorporation of model usage within a PVI assessment.

How is EPA engaging stakeholders, communities, and the public throughout the PVI guidance development process?

OUST has consulted with a number of individual stakeholders from states and tribes, industry, and EPA regional offices to obtain their individual technical and practical input on PVI. OUST presented its proposed plans for PVI guidance at several conferences, workshops, and meetings over the past year and will continue to inform interested parties of progress during the guidance development process.

Need additional information?

EPA OSWER Vapor Intrusion web site: www.epa.gov/oswer/vaporintrusion/

EPA Office of Underground Storage Tanks Web site: www.epa.gov/oust/